

SCIENCE & EDUCATION Impact

Benefits From the USDA/Land-Grant Partnership

Middle of the Stream

Farming practices change to protect water quality.

Farming practices have been blamed for pollution problems in many underground and surface waters. Producers, who rely on high-quality water and have a vested interest in protecting this resource, strive to change practices that adversely affect water quality while maintaining production standards. With help from the U.S. Department of Agriculture (USDA) and Land-Grant institutions, producers are successfully changing the course of events.

Payoff

- **Going underground.** Two percent of our fresh water supply is in underground aquifers, vulnerable to contamination by pesticides and excess plant nutrients such as nitrogen and phosphorus. In recent years, a number of Land-Grant institutions have helped identify sources of groundwater pollution and are now helping clean up and protect water supplies. **Nebraska** Extension personnel helped farmers in 15 counties decrease their nitrogen fertilizer applications by 17.7 million pounds annually, thus reducing groundwater contamination and lowering farmers' nitrogen costs by \$3.5 million. **Wisconsin** researchers developed a modified tillage system that allows corn farmers to maintain current yields while reducing by half the movement of nitrate into groundwater. **Washington State** researchers use fall-planted cover crops to help vegetable farmers reduce nitrogen needs, allowing farmers to retain an average of 150 pounds of nitrogen per acre that might have contaminated groundwater. At **Utah State**, new fertilizer recommendations for at-risk areas have helped protect groundwater and saved one producer \$1,360 in fertilizer costs. **North Carolina State** researchers have developed a controlled drainage system that keeps nutrients out of groundwater and increases corn and soybean yields to the tune of \$5 million annually.
- **On the surface.** Surface water, such as lakes and rivers, also suffers from pollution problems. Not only is surface water used for human consumption, it also provides recreational, ecological, and aesthetic benefits to society. **Wisconsin** Extension programs helped farmers near the state's environmentally fragile Lake

RESEARCH,
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EXTENSION
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Winnebago reduce nitrogen applications, improving the lake's water quality and increasing farm profits by an average of \$17.23 per acre. **California** Extension personnel are helping reduce sediment that was trapping 1,300 pounds of pesticide residues in the ecosystem and harming river wildlife in the San Joaquin River and Sacramento Delta. Sixty-eight percent of the farmland (91,000 acres) in the area is under management systems that have kept 720,000 tons of sediment out of rivers, lakes, and streams.

- **Finding the fragile places.** Research efforts at Land-Grant institutions help farmers identify places where farming and forestry practices are most likely to affect water adversely. A **Purdue** researcher found that 75 percent of the pesticides getting into **Indiana's** groundwater came from 25 percent of the farmland. Detailed maps of the problem areas now allow farmers to pinpoint these areas and adjust their farming practices accordingly. At **Alabama A&M**, researchers are using precision agriculture technology, such as remote sensing, geographic information software, and global positioning satellites, to monitor and predict excessive phosphorus and nitrogen levels in cotton. The scientists plan to expand the use of this technology to other crops as well.

- **Bumping up BMPs.** Best management practices (BMPs) are guidelines that help farmers, foresters, and others do business while also protecting the environment. **Colorado State** Extension taught BMPs to farmers in the Arkansas River Valley of Southeast **Colorado**, helping them save money and reduce salty drainage into the valley. Their efforts have resulted in overall cost savings and productivity increases amounting to \$1.6 million. In **Wisconsin**, Land-Grant efforts helped farmers adopt BMPs that decreased application of fertilizers on corn crops by 47 percent and reduced phosphorus loads from dairy operations by as much as 100 pounds in a year. BMPs developed and taught by **Florida** faculty helped farmers near the Florida Everglades reduce phosphorus levels by 50 percent—double the mandated 25 percent.

- **Irrigation options.** In typical greenhouse and nursery operations, 30 percent to 50 percent of the fertilizers

applied to plants can be lost in runoff and can subsequently enter groundwater and surface water. **Georgia** researchers developed an inexpensive ebb-and-flow irrigation system that recirculates water, reducing water and fertilizer requirements by 25 percent to 30 percent and producing higher-quality plants. **Ohio State** researchers developed an irrigation system that re-uses wastewater and allows small communities to meet new clean water regulations. **Nebraska's** Extension efforts have helped farmers in South Central Nebraska clean up nearby Elm Creek by adopting irrigation and tillage systems that reduce erosion and runoff. Better irrigation practices have saved 82,505 tons of soil over the past few years and have reduced water-use expenses by \$14,685 annually. **Oklahoma State** researchers have developed a low-energy precision-application irrigation system that conserves water and reduces the risk that pesticides and nutrients will leach into the groundwater. **Kansas State** staff demonstrated that a subsurface drip irrigation system could reduce water usage by 25 percent while maintaining current yields.



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